HAOPENG DENG

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EDUCATION

Guangzhou Maritime University **Guangzhou, China** **09/2022-07/2026**
B. Eng. in *Engineering Management*, School of Future Transportation

ACADEMIC EXCHANGE

Tsinghua University & Technical University of Munich **12/2025**
Selected as one of 67 global participants for the "*Smart Sustainable Cities and Transportation*" Winter School, completing 11 modules covering Data-driven Modeling, Mixed-Traffic System, and Urban Computing.

JOURNAL ARTICLES

[1] Xia, X., **Deng, H.**, Tang, J., et al. (2025). Dynamic Traffic Assignment under Mixed Traffic: Modeling, Evolution, and Solution Approaches. *Journal of Transport Science and Engineering*. **(Cover Paper, Oral Presented on *AIAT* 2026 Conference)**. DOI: 10.16544/J.CNKI.CN43-1494/U.20251007001.

[2] **Deng, H.**, Tang, J., Zhan, L., et al. (2025). Research on Traffic Governance Optimization in Kaiping City Based on a GRA–FCE Integrated Framework. Accepted in *Journal of Transportation Engineering*.

[3] **Deng, H.**, Ma, K., Zhan, L., et al. (2025). Structural Equation Modeling of the Relationships among Traffic Safety KAP in Small-Medium Cities. Accepted in *Journal of Transportation Engineering*.

[4] **Deng, H.**, Zheng, F., Zhan, L. (2024). Application of Markov Processes in Traffic Signal Control. *International Core Journal of Engineering*. DOI: 10.6919/ICJE.202411_10(11).0015.

[5] Wang, Q., **Deng, H.**, Deng, H., et al. (2025). Research on the Incentive Mechanism of a Comprehensive Carbon Pricing System for Emission Reduction and Carbon Sink Enhancement. *Journal of Guangzhou Maritime University*. DOI: 1009-8526(2025)01-0074-05.

[6] Wang, Y., Zhang, H., Zhou, Y., **Deng, H**., et al. (2025). Exploring the 2-Part of Class Groups in Quadratic Fields: Perspectives on the Cohen–Lenstra Conjectures. *Mathematics*. DOI: 10.3390/MATH13010051.

CONFERENCE PAPERS

[1] **Deng, H.**, Zheng, F., Xia, X.. (2026). SpinFlow: A Physics-Informed Spin Field Framework for Traffic Phase Inference and Transition Detection. Submitted to *The IEEE International Conference on Intelligent Transportation Systems (ITSC)*.

[2] **Deng, H.**, Zheng, F., Ma, K., et al. (2025). Adaptive Truncated Schatten Norm for Traffic Data Imputation with Complex Missing Patterns. *The 25th COTA International Conference of Transportation Professionals (CICTP)*. American Society of Civil Engineers. (**Best Poster Award**). DOI: 10.1061/9780784486269.009.

[3] Xia, X., **Deng, H.***, Ye, Y. (2026). Fundamental Diagram Modeling and Simulation of Mixed Traffic Flow Considering Functional Degradation. Accepted in *The 26th CICTP Conference*.

RESEARCH EXPERIENCES

Guangdong Provincial Special Fund for Science and Technology Innovation Strategy **07/2024-04/2026**
Title: *Cooperative Game-Based Network Traffic Assignment Mechanisms for Enhancing Urban Transportation Efficiency* | *Grant No. PDJH2024A289* | *Project Leader* | *Advisor: Dr. Lei Hu*

- Authored a systematic review on dynamic traffic assignment (DTA), synthesizing insights from 120+ studies on multi-class vehicle modeling, nonlinear equilibrium evolution, and solution algorithms.
- Developed a VI-based DTA model that unifies UE–SO equilibria into a tunable spectrum, by decoupling CAV penetration into automation levels (AL) and connectivity levels (CL) as evolution variables.
- Proposed the AMPAS algorithm for solving DUE, DSO, and UE–SO mixed equilibria within the AL–CL framework, achieving 27.2% faster convergence than gradient projection on medium-scale networks.
- Directed team task delegation, milestone tracking, and mentoring of lower year members; coordinate regular progress meetings to align efforts and ensure on-schedule research deliverables.

Guangdong Provincial College Student Innovation & Entrepreneur Training Program **11/2024-02/2026**
Title: *Intelligent Recognition of Urban Traffic Equilibrium States under Air-Ground Collaborative Monitoring* | *Core Member (2nd)* | *Instructor: Prof. Xinhai Xia*

- Integrating heterogeneous data sources from roadside sensors, probe vehicles, and UAVs to construct high-dimensional traffic flow tensors, supporting accurate traffic equilibrium state recognition.

- Formulated three representative real-world data loss structures—element-wise, fiber-wise, and mixed—within urban traffic flow tensors, serving as a rigorous testbed for refining data recovery algorithms.
- Developed an adaptive truncated Schatten norm-based low-rank tensor completion model to effectively fill gaps in traffic datasets with complex missing patterns, improving MAPE by 10.6% and RMSE by 6.1%.
- Facilitated industry-academia partnership for traffic survey equipment and training, guided junior students in fieldwork to create datasets for analysing traffic flow dynamics and defining equilibrium states.

High-Quality Development Project for Hundred Counties, Thousand Towns, Myriad Villages **07/2024**

Title: *Investigation on Traffic Safety and Planning in Kaiping City* | *Project Leader* | *Advisor: Dr. Lei Hu*

- Collaborated with the Municipal Transportation Bureau to analyse traffic accident and violation data, identifying crash hotspots and associated hazard types, and designing two targeted questionnaires.
- Led a seven-person team to conduct on-site surveys, interviews, inspections, and drone photography, collecting data on traffic flow, vehicle management, pedestrian movement, and infrastructure.
- Utilised SPSS and LLM tools for analysis of survey data and interview transcripts, uncovering key issues and generating actionable insights to inform improvements in urban traffic safety and planning.
- Authored two papers—one on traffic safety behaviour, attitude and cognition relationship using Structural Equation Modeling, and another on the city's traffic governance assessment via Grey Relational and Fuzzy Evaluation methods; a synthesized report was later adopted by the Municipal Transportation Bureau.

INTERNSHIP

Guangzhou Xueshujia Software Technology Co., Ltd. **01/2025-05/2025**

Simulation Assistant Engineer | *Mentor: Dr. Shen Wenchao*

- Deployed a multi-agent reinforcement learning module for CAV control in the company's traffic simulator, enhancing its capability to model and visualise V2X-based highway shock-wave propagation.
- Benchmarked the simulator against leading platforms such as SUMO using identical real-world trajectory datasets, diagnosing fidelity gaps and recommending optimisations to enhance competitiveness.
- Surveyed major traffic-related competitions and conferences over the past five years, analysing emerging trends in the field and discovering potential opportunities for industry–academia collaboration.

EXTRACURRICULAR ACTIVITIES

Innovation and Entrepreneurship Incubation Park **03/2024-03/2025**

AIGC Imaging and Media Entrepreneurial Project | *Founder and Technical Lead*

- Designed customized image generation workflows based on Stable Diffusion and Midjourney, providing AIGC solutions for industrial clients such as shipping logistics and sports apparel.
- Developed special-effect process for e-commerce model clothing replacement, product rendering, and cosplay photo effects, estimated to cut costs by ~20% and boost efficiency by ~30%.

Voluntary Teaching Programme at Maoming Rural Primary School **07/2023**

- Designed and delivered interactive lessons for primary school students, while engaging with local communities to gather insights into rural revitalisation and industrial development.
- Wrote a community report and four promotional articles to publicise local industries and rural life, inspiring more students to participate in volunteer education initiatives.

AWARDS & HONOURS

- Best Poster Award (International), The 25th CICTP Conference, COTA **2025**
- Meritorious Winner (International), Interdisciplinary Contest in Modeling (ICM), COMAP **2025**
- Third Prize (Provincial) 18th "Challenge Cup" National Students' Academic Works Competition **2025**
- Yang Hanlin Scholarship (Top 0.2%, 3/1210), Guangzhou Maritime University **2025**
- Third Prize (Provincial), China Undergraduate Mathematical Contest in Modeling **2024**
- Second Prize (School), 19th National Competition of Transport Science and Technology **2024**
- Science and Technology Innovation Model Scholarship, Guangzhou Maritime University **2024**
- Third-Class Merit Scholarship, Guangzhou Maritime University **2023**
- Bronze Award (Provincial), FLTRP · ETIC Cup English Writing Contest **2023**

SKILLS & LANGUAGES

Technical Tools: Python, MATLAB, SUMO, LaTeX, Git, SPSS, Photoshop, Illustrator

Languages: English (fluent), Mandarin (native), Cantonese (native)